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Claims Listing

1 1. (currently amended) An-A dynamic optical router for routing optical
2 signals to a plurality of output channels, comprising at least one frequency router
3 having a plurality of input ports and a plurality of output ports, characterized in
4 that: each optical signal contains destination information, at least one input port
5 simultaneously receives at least two optical signals to be frequency routed, and
6 at least one output port simultaneously presents presenting—at least two
7 frequency routed optical signals, and at least one output port couples routed
8 optical signals to a plurality of output channels, wherein each optical signal to be
9 frequency routed is dynamically tuned to a particular color colored in response
10 to its destination information.

1 2. (original) The optical router of Claim 1, further comprising:
2 a plurality of combiners, one combiner for combining the at least
3 two optical signals to be routed; and
4 a plurality of receivers, one receiver for separating each of the at
5 least two routed optical signals to intended destinations in response to
6 destination information.

1 3. (original) The optical router of Claim 2, wherein the frequency router
2 routes optical signals by color, the at least two optical signals to be routed having
3 different colors, and the at least two routed optical signals having different
4 colors.

1 4. (original) The optical router of Claim 3, wherein the optical router
2 receives packets of data, each packet of data having destination information, each
3 combiner coupled with at least one converter of a plurality, each converter
4 converting at least one packet of data to an optical signal colored in response to
5 the destination information of the corresponding at least one packet of data.

1 5. (currently amended) The optical ~~router converter~~ of Claim 4, wherein the
2 frequency router comprises:

3 at least one input waveguide;

4 at least one output waveguide;

5 a first and a second free space region, the first free space region
6 coupled with the at least one input waveguide and the second free space
7 region coupled with the at least one output waveguide; and

8 an optical grating having a plurality of unequal length waveguides,
9 each unequal length waveguide coupled between the first free space
10 region and the second free space region.

1 6. (original) The optical router of Claim 5, wherein each receiver comprises:

2 at least two tunable filters; and

3 at least one splitter for splitting the at least two routed optical
4 signals between the at least two tunable filters such that at least one of the
5 at least two tunable filters is tuned to pass one of the at least two routed
6 optical signals to an intended destination.

1 7. (original) The optical router of Claim 5, wherein each receiver comprises:

2 at least two second stage converters;

3 at least one demultiplexer for separating each of the at least two
4 routed optical signals into one of the at least two second stage converters,
5 each second stage converter converting one of the routed optical signals to
6 a second stage optical signal colored in response to the destination
7 information of the corresponding at least one packet of data; and

8 at least one second stage combiner for combining second stage
9 optical signals into a combined second stage optical signal to be frequency
10 routed.

1 8. (original) The optical router of Claim 7, further comprising:

2 a second stage frequency router having a plurality of second stage
3 input ports and a plurality of second stage output ports, one second stage
4 input port receiving the combined second stage optical signal to be
5 frequency routed; and

6 a plurality of output stage demultiplexers, each output stage
7 demultiplexer being coupled one second stage output port of the second

8 stage frequency router such that each second stage optical signal of the
9 combined routed second stage optical signal is presented to an intended
10 destination.

1 9. (currently amended) ~~An~~ A dynamic optical router for routing a plurality
2 of packets, N, of data to a plurality of output channels, each packet of data
3 having destination information, the optical router comprising:

4 a plurality of converters, each converter receiving a packet of data
5 and providing an optical signal to be combined and routed, each optical
6 signal being colored in response to the destination information of the
7 respective packet of data;

8 a plurality of combiners, one combiner combining at least two
9 optical signals to be routed; characterized by:

10 at least one frequency router having a plurality of input ports, M,
11 and a plurality of output ports, M, at least one output port simultaneously
12 receiving the at least two optical signals to be routed, ~~and~~ at least one
13 output port simultaneously presenting at least two routed optical signals,
14 and at least one output port coupling routed optical signals to a plurality
15 of output channels, the at least one frequency router routing optical
16 signals by color dynamically in response to said destination information;

17 a plurality of receivers having a plurality of outputs corresponding
18 to said output channels, which in turn correspond to intended
19 destinations; and

20 a plurality of splitters, one splitter splitting the at least two routed
21 optical signals ~~between at least two receivers such that~~ along separate

22 ~~optical paths toward at least two output channels, at least one of the at~~
23 ~~least two receivers; a receiver in one of the paths being is~~ tuned to pass one
24 of the at least two routed optical signals to an intended destination.

1 10. (original) The optical router of Claim 9, wherein each converter comprise
2 a tunable light source for generating one optical signal, and for coloring the one
3 optical signal in response to the destination information of the respective packet
4 of data, and wherein each receiver comprises a tunable filter for tuning to a color
5 to pass one of the at least two routed optical signals to an intended destination.

1 11. (original) The optical router of Claim 10, wherein each converter
2 comprises a converter for converting at least one packet of data to the one optical
3 signal colored in response to destination information, and wherein each receiver
4 comprises a converter for converting a routed optical signal into a routed packet
5 of data.

1 12. (original) The optical router of Claim 11, further comprising a scheduler
2 for scheduling the conversion each packet of data into an optical signal and for
3 scheduling the tuning of the tunable filter.

1 13. (currently amended) The optical ~~router converter~~ of Claim 11, wherein
2 the frequency router comprises:

3 at least one input waveguide;

4 at least one output waveguide;

5 a first and a second free space region, the first free space region
6 coupled with the at least one input waveguide and the second free space
7 region coupled with the at least one output waveguide; and

8 an optical grating having a plurality of unequal length waveguides,
9 each unequal length waveguide coupled between the first free space
10 region and the second free space region.

1 14. (currently amended) ~~An~~ A dynamic optical router for routing a plurality
2 of packets, N, of data to a plurality of output channels, each packet of data
3 having destination information, the optical router comprising:

4 a plurality of first stage converters, each converter receiving a
5 packet of data and providing an optical signal to be combined and routed,
6 each optical signal being colored in response to the destination
7 information of the respective packet of data;

8 a plurality of first stage combiners, one combiner combining at least
9 two optical signals to be routed; characterized by:

10 a first stage frequency router having a plurality of input ports, M,
11 and a plurality of output ports, M, at least one input output-port
12 simultaneously receiving the combined at least two optical signals to be
13 routed, ~~and~~ at least one output port simultaneously presenting at least
14 two first stage routed optical signals and at least one output port coupling
15 routed optical signals to a plurality of output channels, the first stage

16 frequency router routing optical signals by color dynamically in response
17 to said destination information;

18 a plurality of second stage converters, each second stage converter
19 providing a second stage optical signal to be combined and routed, each
20 second stage optical signal being colored in response to the destination
21 information of the respective packet of data; and each second stage
22 converter including a buffer that delays selected packets based on the
23 destination information;

24 a plurality of second stage demultiplexers, one second stage
25 demultiplexer presenting each of the at least two routed optical signals
26 from the first stage frequency router to a second stage converter;

27 a plurality of second stage combiners, one second stage combiner
28 combining at least two second stage optical signals to be routed; and

29 a second stage frequency router having a plurality of second stage
30 input ports, M, and a plurality of second stage output ports, M, at least
31 one second stage input port simultaneously receiving at least two second
32 stage optical signals to be routed, ~~and~~ at least one second stage output
33 port simultaneously presenting at least two second stage routed optical
34 signals, and at least one output port coupling routed optical signals to a
35 plurality of output channels. the second stage frequency router routing
36 second stage optical signals by color dynamically in response to said
37 destination information.

1 15. (original) The optical router of Claim 14, further comprising a plurality of
2 output stage receivers, each output stage receiver having an output stage

3 demultiplexer, one output stage demultiplexer presenting each of the at least two
4 second stage routed optical signals from the second stage frequency router to an
5 intended destination.

1 16. (original) The optical router of Claim 14, further comprising a plurality of
2 output stage receivers, each output stage receiver comprising:

3 at least two tunable filters for tuning to a color; and

4 a splitter coupled with the at least two tunable filters, wherein one
5 output stage receiver splits the at least two second stage routed optical
6 signals between the corresponding at least two tunable filters such that at
7 least one of the at least two tunable filters is tuned to pass one of the at
8 least two second stage routed optical signals to an intended destination.

1 17. (original) The optical router of Claim 14, wherein each first stage
2 converter comprises a first stage tunable light source for generating one optical
3 signal, and for coloring the one optical signal in response to the destination
4 information of the respective packet of data, each second stage converter
5 comprises a second stage tunable light source for generating one second stage
6 optical signal, and for coloring the one second stage optical signal in response to
7 the destination information of the respective packet of data, and further
8 comprising a scheduler for scheduling the coloring of each optical signal and
9 each second stage optical signal.

1 18. (original) The optical router of Claim 17, wherein each first stage
2 converter comprises a first stage converter for converting at least one packet of
3 data to the one optical signal colored in response to destination information of
4 the respective packet of data, each second stage converter comprises a second
5 stage converter for coloring one second stage optical signal in response to
6 destination information of the respective packet of data.

1 19. (original) The optical router of Claim 14, wherein at least one of the first
2 and the second stage frequency routers comprise:

3 at least one input waveguide;

4 at least one output waveguide;

5 a first and a second free space region, the first free space region
6 coupled with the at least one input waveguide and the second free space
7 region coupled with the at least one output waveguide; and

8 an optical grating having a plurality of unequal length waveguides,
9 each unequal length waveguide coupled between the first free space
10 region and the second free space region.

1 20. (original) The optical router of Claim 14, wherein ~~the first and the second~~
2 ~~stage frequency routers are formed by one frequency~~ each second stage
3 ~~converter, in response to destination information, re-colors the optical signals~~
4 ~~that are received thereby.~~

1 21. (currently amended) A method for routing optical signals to a plurality of
2 output channels comprising:

3 determining a first, second and third destination for a first, second
4 and third packet of data, respectively;

5 generating a first, second and third carrier signal having a first,
6 second and third frequency associated with the first, second and third
7 destinations, respectively;

8 modulating the first, second and third carrier signals in response to
9 the first, second and third packets of data to form a first, second and third
10 optical signal; and

11 routing the first, second and third optical signals by a frequency
12 routing device, the routing characterized by comprising:

13 simultaneously receiving in a first input of a frequency
14 router at least two of the first, second and third signals; and

15 simultaneously presenting from a first output of the
16 frequency router at least two of the first, second and third routed
17 optical signals; and coupling routed optical signals from at least
18 one output port to a plurality of output channels.

1 22. (currently amended) A method for routing a plurality of optical signals to
2 a plurality of output channels as a function of color through a router having a
3 plurality of inputs-input ports and a plurality of outputs-output ports, the
4 method comprising characterized by the steps of:

5 simultaneously receiving ~~to~~ at at least one of the input ports at least
6 two optical signals respectively colored as a function of destination information
7 contained therein; and
8 simultaneously presenting ~~from~~ to at least one of the output ports
9 at least two optical signals routed as a function of their color; and coupling
10 routed optical signals from at least one output port to a plurality of output
11 channels.

1 23. (currently amended) The method of claim 22, after the presenting step
2 further comprising the step of processing each of the presented at least two
3 routed optical signals from the at least one of the output ports.

1 24. (currently amended) The method of claim 22, ~~wherein the step of~~
2 ~~simultaneously applying to at least one of the input ports comprises further~~
3 comprising the step of coloring each optical signal of the plurality is as a further
4 function of which input port of the plurality of input ports it is applied to.

1 25. (original) A method for use in conjunction with a router which has a
2 plurality of input ports and plurality of output ports, said router being of a type
3 which routes optical signals applied to its input ports to particular ones of said
4 output ports as a function of the respective colors of said optical signals, the
5 method:

6 applying each of a plurality of optical signals to a respective one of the
7 input ports, this including the step of concurrently applying to an
8 individual one of said input ports at least two optical signals which have
9 been respectively colored as a function of destination information

10 contained in said optical signals, at least two of said optical signals being
11 concurrently routed to a particular one of said output ports.

1 26. (original) The invention of claim 25, comprising the further step of
2 concurrently removing from said particular one of said output ports said two
3 optical signals concurrently routed thereto.

1 27. (original) The invention of claim 25, wherein the coloring of each said
2 optical signal is a further function of which input port it is applied to.